## FURTHER SUGGESTIONS FOR THE APPLICATION OF THE LIPMAN-GORDON METHOD OF TREE INJECTION

IN other papers,[1] we have reported results obtained with a method of tree injection which we have found to be practicable and easily applied to ordinary problems connected with orchard work. We have also suggested numerous ways in which our method of tree injection may be applied to the solution of certain specific problems. Since then we have definitely proved that our method of treating chlorosis in trees furnishes a facile and inexpensive as well as a certain method of curing chlorosis. Our detailed evidence will soon be furnished in another paper. We have also shown our method of injection to be practicable for the purpose of furnishing so-called nutrient salts to trees, thus rendering available a feasible method of curing deficiency diseases and solving some fertilizer problems. While we do not desire at this juncture to name other applications of our method which are of the greatest economic importance and on which we are now carrying on experiments, we do wish to mention three important applications of the injection method which have not yet been tested, but which should yield results of great practical significance. It is the purpose of this note to call attention to these possibilities so that others as well as ourselves may give them a trial. They are as follows:

(1) The protection of citrus and similar trees against freezing by injections of electrolytes and non-electrolytes.

Frost-damage in citrus-growing districts is a matter of very great economic moment. The heating of orchards, as now practiced, is extremely expensive and not always effective. If soluble substances capable of lowering the freezing point of plant sap are injected into trees, it should be possible to protect them against any but the most severe frosts at a very small expenditure of time and money.

(2) The stimulation of fruit trees to much greater fruit bud production than the normal.

A number of investigators have demonstrated in recent years that the extent of fruit bud production is conditioned upon a certain ratio of carbohydrate to nitrogen in the active cells at a certain season of the year. It has even been shown that the ratio in question is probably more particularly a starch-nitrogen rather than a sugar-nitrogen ratio. If this is true, it should be a simple matter to apply our method of tree injection at the right season to the infusion of the needed substances to bring about the desired carbohydrate-nitrogen ratio for abundant fruit-bud formation.

(3) The cure of the chestnut blight.

A most lamentable situation has arisen on the Atlantic coast in recent years, owing to the almost complete annihilation of chestnut trees by the chestnut blight fungus. It should be possible from what we have learned in our own experiments to introduce into infected chestnut trees by our method of injection certain substances in quantities which we have shown to be harmless to the tree and which at the same time would destroy the fungus.

We look forward to fruitful results from all these as well as other applications of our method of tree injection.

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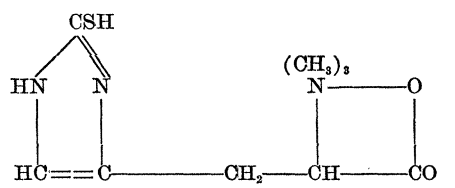
[1] "Tree Injection Cure for Chlorosis in Citrus Trees," Proc. Fifth Annual Placer County Fruit Growers' Convention of October 6th and 7th, 1925, held at Auburn, California. "Further Studies on New Methods in the Physiology and Pathology of Plants," *Jour. Gen. Physiology*, May 20, 1925, Vol. 7, No. 5, pp. 615–623.

## THE CHEMICAL CONSTITUTION OF THIASINE[1]

THIASINE, a sulfur-containing compound isolated from blood[2] on boiling with alkali yields trimethylamine and a yellow, difficultly soluble acid. On treatment of the latter compound with nitric acid the nitrate of urocanic acid is obtained. These, and other reactions to be detailed later, together with elementary analysis and specific rotation, show that thiasine is identical with the base ergothioneine, isolated from ergot by Tanret[3] in 1909. In 1911 Barger and Ewins[4] showed that ergothioneine is the betaine of thiolhistidine, and has the following structural formula:

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[2] Benedict, S. R., Newton, E. B., and Behre, J. A., *J. Biol. Chem.*, 1926, lxvii, p. 267.

[3] Tanret, Ch., 1909, *J. Pharm. Chim.* (vi), 30, p. 145.

[4] Barger, G., and Ewins, A. J., *J. Chem. Soc.*, 99, 2336.